

REMARKS

Claims 1-19 are pending in this case. Claims 20-29 are canceled with this response. Reconsideration of the application is respectfully requested in light of the above amendments and the following remarks.

I. REJECTION OF CLAIMS 1-19 UNDER 35 U.S.C. § 102(b)

Claims 1-19 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,885,402 (Esquibel). Reconsideration and withdrawal of the rejection is respectfully requested for at least the following reasons.

i. Esquibel does not teach a deposition chamber as recited in claim 1

Claim 1 is directed to a system for depositing films on semiconductor wafers, and comprises a ***deposition chamber*** and an acoustic microbalance configured for mounting within the deposition chamber. Esquibel does not teach a deposition chamber. Rather, Esquibel teaches a ***plasma etch chamber***, wherein films are etched (material removal) rather than deposited. Thus Esquibel does not anticipate the invention of claim 1. Accordingly, withdrawal of the rejection is respectfully requested.

ii. The cited art does not teach a controller that detects a deposition process endpoint based on data provided by the acoustic microbalance, as recited in claim 3.

Claim 3 is directed to a system having a deposition chamber, an acoustic microbalance therein, and a controller. The controller is configured to detect a ***deposition process endpoint based on data provided by the acoustic microbalance***. Esquibel does not teach this feature. As stated above, Esquibel does not teach a deposition chamber, but rather teaches an etch apparatus. ***Although the cited reference does refer to endpoint detection, such process endpoint detection relates to endpoint detection of an etch process, and not a deposition process as claimed.*** Further, in Esquibel, such endpoint detection is not based on data from an

acoustic microbalance as claimed, **but instead is provided by an optical endpoint detector** (see, e.g., Col. 5, Ins. 19-21, and Col. 7, Ins. 14-17). Clearly then, the cited references does not anticipate the invention of claim 3; accordingly, withdrawal of the rejection is respectfully requested.

- iii. ***Esquibel does not teach a controller that encodes a probabilistic dependency model that relates a set of input variables including at least a measurement from the acoustic microbalance to an output that relates to an effect of modifying a process condition, as recited in claim 5.***

Claim 5 is directed to a system for depositing film on wafers, wherein the controller comprises a computer system component that encodes a probabilistic dependency model. The model relates a set of input variables, wherein at least one of the input variables is a measurement from the acoustic microbalance, to one or more outputs. The outputs are employed to affect a modification of one or more deposition process conditions. The cited art does not teach this feature. Although Esquibel does disclose a controller, ***no teaching is found in the reference relating to a probabilistic dependency model as claimed.*** In addition, even if such a model were disclosed, such a model certainly is not employed to affect a deposition process condition, since the cited reference is directed solely to an etch process. Therefore for this additional reason, claim 5 is not anticipated by Esquibel. Accordingly, withdrawal of the rejection is respectfully requested.

- iv. ***The cited reference does not teach an acoustic microbalance mounted on one or more of the semiconductor wafers being processed or on a control wafer, as recited in claims 6 and 7, respectively.***

Claim 6 depends upon claim 1, and further recites the acoustic microbalance mounted on one of the semiconductor wafers undergoing processing in the deposition chamber. Esquibel does not teach this feature; instead, the cited art mounts a quartz crystal microbalance ***on a sidewall of the plasma etch chamber***, and the

microbalance is employed for determining chamber wall build-up during etching in order to schedule chamber cleaning (see, e.g., Col. 6, ln. 50 - Col. 7, ln. 3). Therefore not only does the reference not teach this feature, but one of ordinary skill in the art would not be motivated to modify the art in accordance with the present invention, because to do so would frustrate the central purpose (sidewall build-up detection) for which the QCM is employed. That is, location of the QCM on a wafer in the chamber as claimed would frustrate the goal of detecting build-up on the chamber walls. Therefore Esquibel does not anticipate the invention of claim 6.

Similarly, claim 7 comprises an acoustic microbalance mounted on a control wafer. As stated above with respect to claim 6, the cited reference neither teaches nor suggests such feature. Thus claim 7 is also not anticipated by Esquibel. Accordingly, for these additional reasons the rejection of claims 6 and 7 is respectfully requested.

v. *Esquibel does not teach a surface acoustic wave device, as recited in claim 8.*

Claim 8 depends upon claim 1, and further recites that the acoustic microbalance comprises a surface acoustic wave device. Esquibel does not teach a surface acoustic wave device, but instead appears to disclose only a quartz crystal microbalance (QCM). Therefore the cited art does not anticipate the invention of claim 8, and withdrawal of the rejection thereof is thus respectfully requested.

vi. *Esquibel does not the features of claim 10.*

Claim comprises a system for depositing film on semiconductor wafers. The system comprises a deposition chamber, an acoustic microbalance having a cantilever within the deposition chamber, and a controller. Further, the controller comprises a computer system component that encodes a model or database that accounts for a difference between an extent of deposition on the cantilever and an extent of deposition on the semiconductor wafer within the deposition chamber in order to detect an endpoint of a deposition process thereof. The cited art does not the above features.

As highlighted above in conjunction with claim 1, the cited art does not teach a deposition chamber, but instead discloses a plasma etch chamber. In addition, to the extent the reference does teach a controller for endpoint detection, such endpoint detection is related to a plasma etch process instead of a film deposition process as claimed. Further, ***the cited art does not teach use of an acoustic microbalance for purposes of endpoint detection as claimed, but instead uses a microbalance to determine when to clean the chamber. Endpoint detection is instead provided by Esquibel using an optical endpoint detector.*** Lastly, the cited art does not teach the claimed controller details of the present invention. More particularly, the cited art does not teach a controller that encodes a model or database to account for a difference between an extent of deposition on the cantilever and the semiconductor wafer. Therefore for all of the above reasons, claim 10 is not anticipated by the cited art. Accordingly, withdrawal of the rejection is respectfully requested.

II. CONCLUSION

For at least the above reasons, the pending claims are believed to be in condition for allowance and reconsideration thereof is requested.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.



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Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 50-1733, AMDP653USUS.

Respectfully submitted,
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CERTIFICATE OF MAILING (37 CFR 1.8a)

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date:

January 9, 2004

Christine Gillroy